

What is claimed is:

- 1 1. A method of generating acoustic morphemes, comprising:
2 receiving training speech;
3 selecting candidate phone-phrases from the training speech;
4 selecting salient phone-phrases from the candidate phone-phrases
5 based on salience measurements;
6 clustering the salient phone-phrases based on semantic and
7 syntactic similarities into acoustic morphemes.
- 1 2. The method of claim 1, further comprising:
2 storing the acoustic morphemes in a database.
- 1 3. The method of claim 2, wherein the acoustic morpheme database
2 is used by a speech recognition and understanding system.
- 1 4. The method of claim 1, wherein the step of selecting candidate
2 phone-phrases includes:
3 filtering the training speech;
4 selecting all observed phone sequences of a predetermined length;
5 and
6 selecting as candidate phone-phrases the phone sequences that
7 are of at least the predetermined length.
- 1 5. The method of claim 1, wherein the training speech includes at
2 least one of verbal and non-verbal speech.
- 1 6. The method of claim 5, wherein the non-verbal speech includes the
2 use of at least one of gestures, body movements, head movements, non-
3 responses, text, keyboard entries, keypad entries, mouse clicks, DTMF codes,
4 pointers, stylus, cable set-top box entries, graphical user interface entries and
5 touchscreen entries.
- 1 7. The method of claim 1, wherein the training speech includes
2 multimodal forms.
- 1 8. The method of claim 1, wherein the training speech is
2 untranscribed.
- 1 9. The method of claim 1, wherein the training speech is transcribed.

1 10. The method of claim 1, wherein the salient phone-phrases are
2 selected using a test for significance.

1 11. The method of claim 1, wherein the salient phone-phrases are
2 clustered into acoustic morphemes using a distortion measure between the
3 salient phone-phrases.

1 12. The method of claim 11, wherein the distortion measure is based
2 on at least one of string distortion, semantic distortion and syntactic distortion.

1 13. A method of generating morphemes, comprising:
2 receiving training speech;
3 selecting candidate sub-morphemes from the training speech;
4 selecting salient sub-morphemes from the candidate sub-
5 morphemes based on salience measurements;
6 clustering the salient sub-morphemes based on semantic and
7 syntactic similarities into morphemes.

1 14. The method of claim 13, wherein the morphemes are at least one
2 of acoustic and non-acoustic.

1 15. The method of claim 13, further comprising:
2 storing the morphemes in a database.

1 16. The method of claim 15, wherein the morpheme database is used
2 by a speech recognition and understanding system.

1 17. The method of claim 13, wherein the step of selecting candidate
2 sub-morphemes includes:

3 filtering the training speech;
4 selecting all observed sub-morpheme sequences of a
5 predetermined length; and
6 selecting as candidate sub-morphemes the sub-morpheme
7 sequences that are of at least the predetermined length.

1 18. The method of claim 13, wherein the training speech includes at
2 least one of verbal and non-verbal speech.

1 19. The method of claim 18, wherein the non-verbal speech includes
2 the use of at least one of gestures, body movements, head movements, non-

3 responses, text, keyboard entries, keypad entries, mouse clicks, DTMF codes,
4 pointers, stylus, cable set-top box entries, graphical user interface entries and
5 touchscreen entries.

1 20. The method of claim 13, wherein the training speech includes
2 multimodal forms.

1 21. The method of claim 13, wherein the training speech is
2 untranscribed.

1 22. The method of claim 13, wherein the training speech is transcribed.

1 23. The method of claim 13, wherein the salient sub-morphemes are
2 selected using a test for significance.

1 24. The method of claim 13, wherein the salient sub-morphemes are
2 clustered into morphemes using a distortion measure between the salient sub-
3 morphemes.

1 25. The method of claim 24, wherein the distortion measure is based
2 on at least one of string distortion, semantic distortion and syntactic distortion.